



*cutting through complexity™*

# Financing Nuclear: key issues

***Robert Vartevanian,***

Partner,

Global Infrastructure and Projects Group

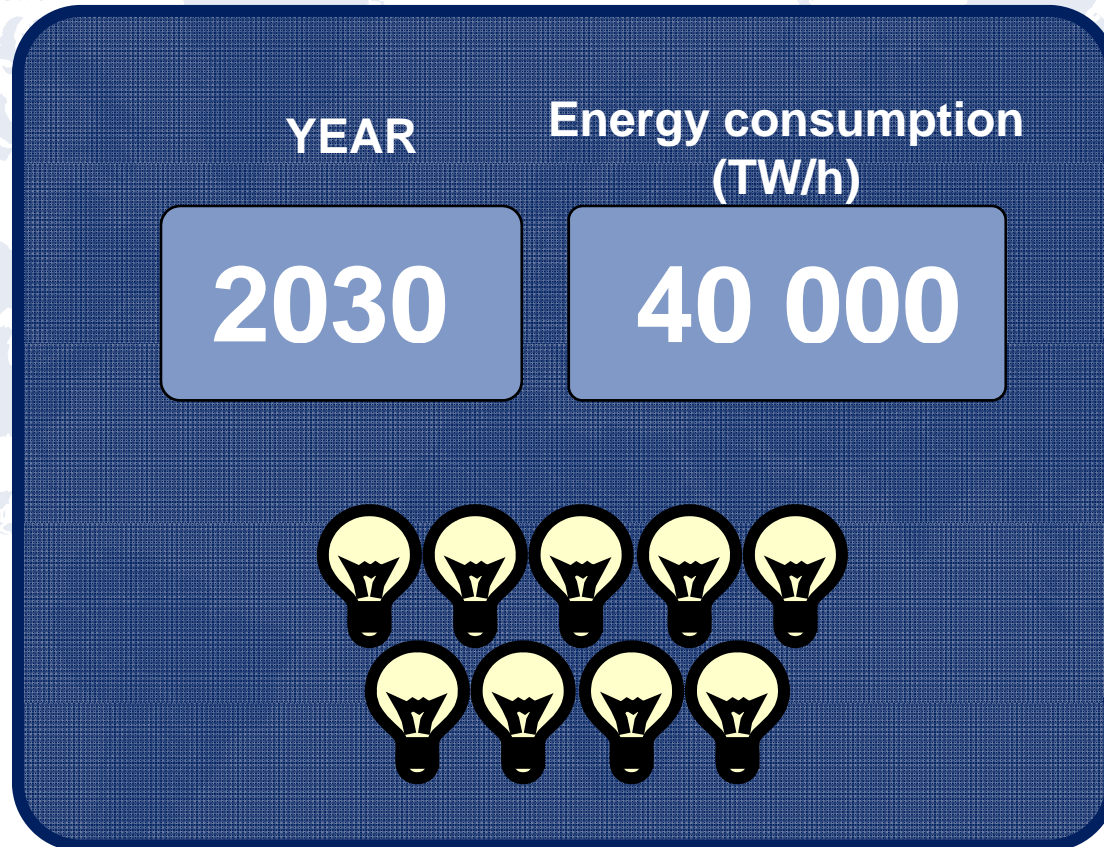
Russia & CIS

Corporate Finance

Advisory services



# The Global Challenge



# The Global Challenge

6% energy consumption growth per year



Budget \$ 20 000 000 000 000

*Increasing Energy Demand*

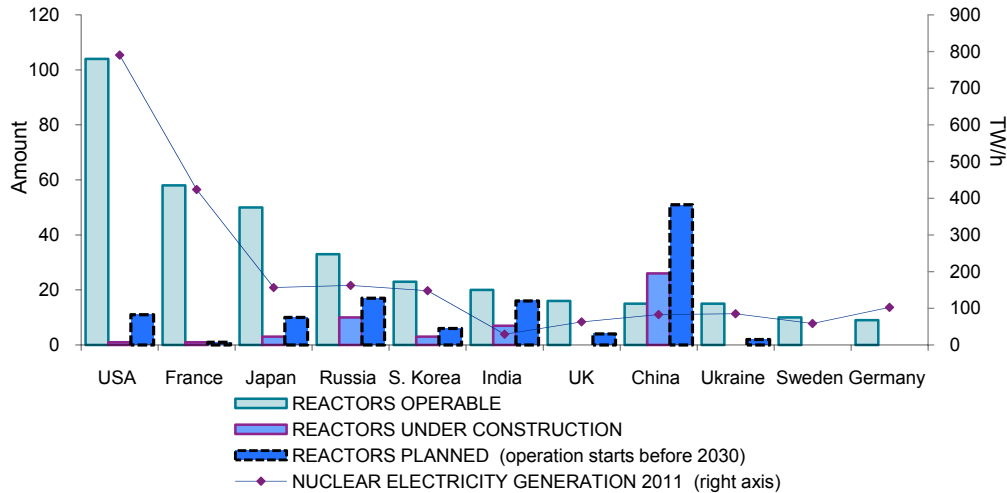
*Climate Change*

*Economics*

*Security of Supply*

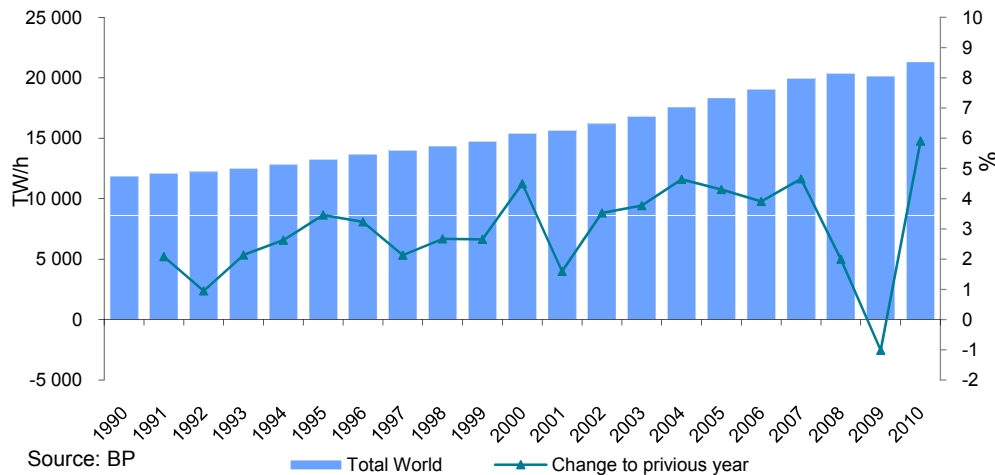

# Nuclear industry overview

## Key nuclear energy producers



Source: World Nuclear Association

## Energy consumption



Source: BP

Legend: Total World (blue bars), Change to previous year (green line)

## Nuclear market: current situation

- Various sources indicate that over 50 countries worldwide are either actively planning or seriously considering new nuclear as part of their energy generation mix (over 160 reactors are planned to be constructed by the 2030)
- As for May 2012 there are 433 nuclear reactors operating in the world 11 fewer than it was in 2002
- The role of nuclear power is declining steadily and now accounts for about 13% of the world's electricity generation
- By May 2012 Russia has 10 reactors under construction – second largest number after China
- China plans to construct 51 nuclear reactors by 2030
- Russia holds 4<sup>th</sup> position in the world by number of operable reactors (33 reactors) and holds 3<sup>rd</sup> place of nuclear electricity generation (162 TW/h), which is around 17% of total energy produced in Russia
- Russia is a home of around 10% of the world's assured uranium resources
- World's total nuclear energy generation amounts to 2 518 TW/h

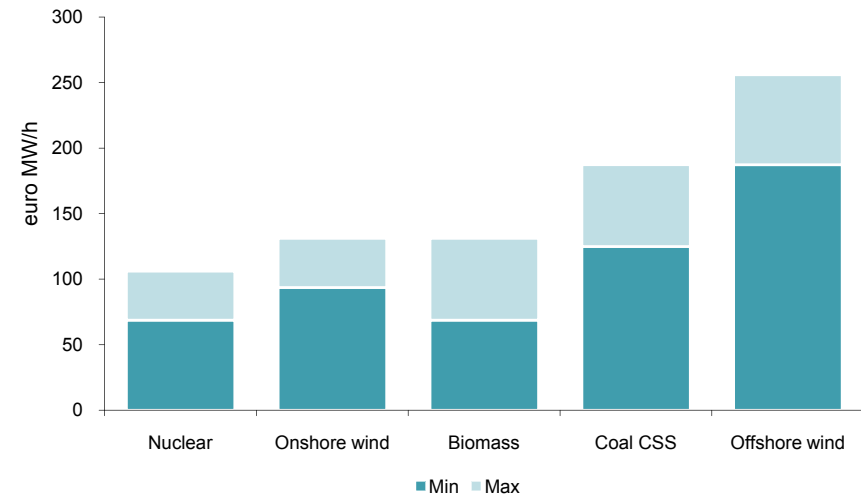
Source: KPMG data, World Nuclear Association, BP

# Why is nuclear hard to finance?

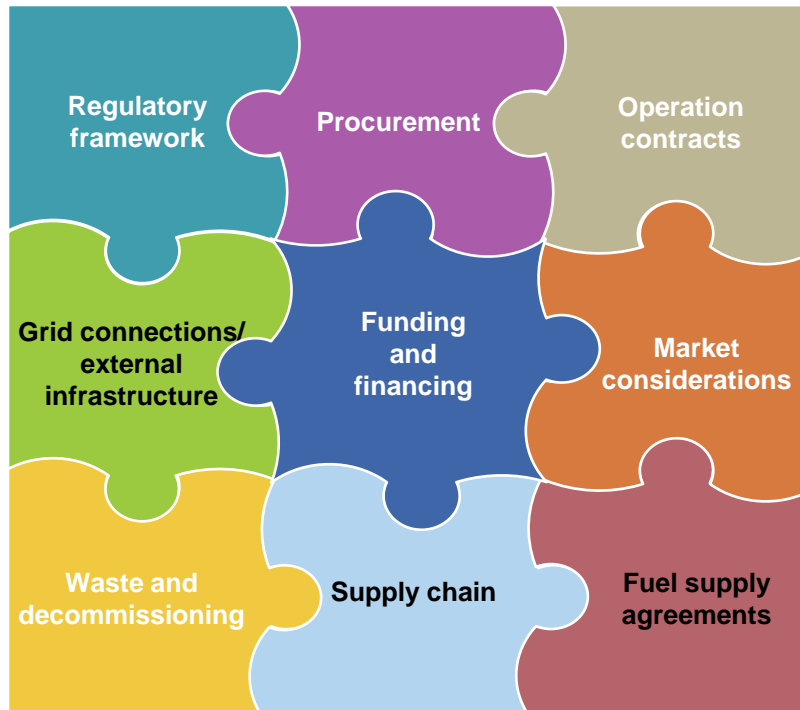
## Key issues

- Size and complexity of project(s)
- Cost uncertainty
- Programme uncertainty
- Revenue uncertainty
  - limited hedging possibilities
- Regulatory uncertainty
  - licensing
  - Planning
  - Decommissioning
- Influence risk

## Levelised costs of low –carbon technologies

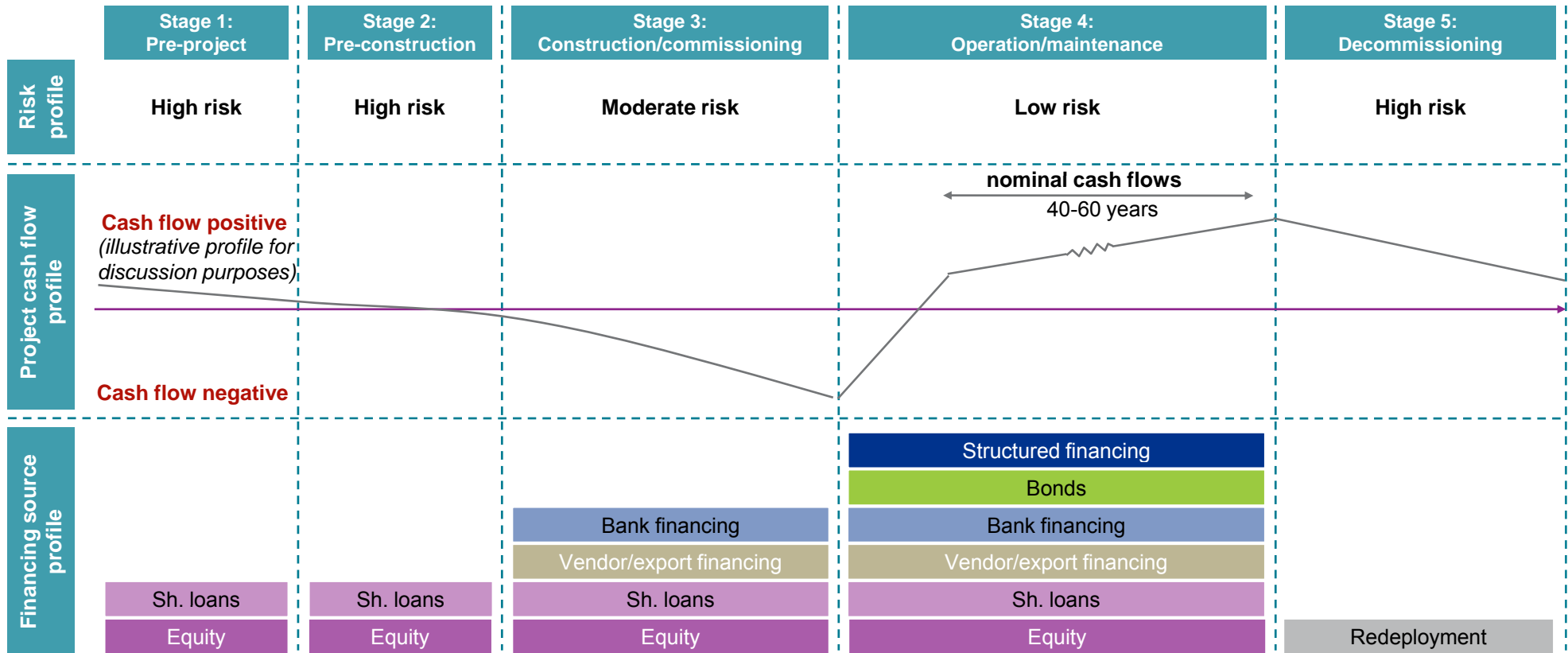


# Critical success factors of any nuclear new build programme

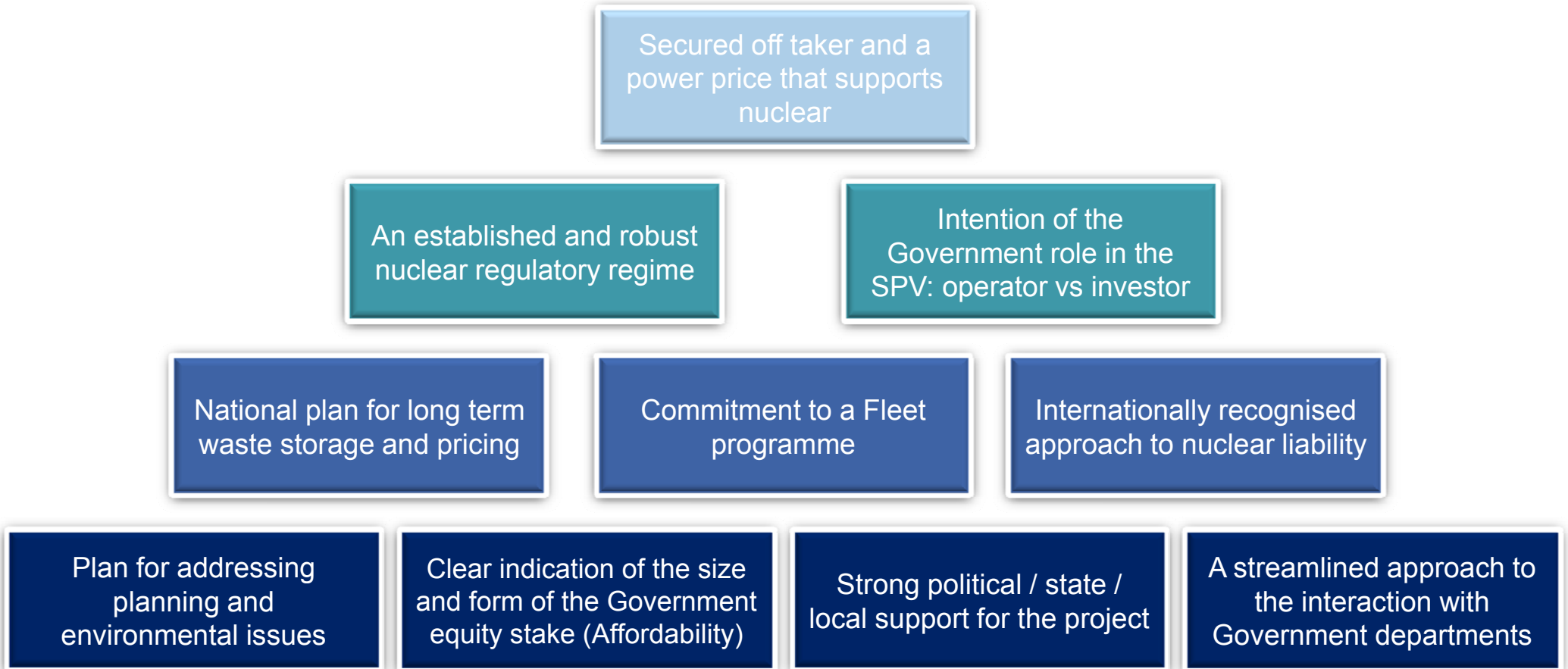


- Good up front strategic planning to ensure a clear framework is in place in which to make key decisions.
- An appropriate project risk environment is put in place and maintained.
- Understanding the risk allocations appropriate to the whole deal and understanding how the procurement can drive the right behaviors and facilitate future financing options.
- Establishment of an appropriate legal and regulatory environment.
- An appropriate capital structure.
- Construction timetables need to be realistic with appropriate mitigation measures.
- Appropriate operational risk transfer.
- Power purchase agreements/long term takeoff deals.
- Long term political support required and potential underpinning.
- Appropriate and timely mitigation of regulatory risks.

# Changes in financing and risk profile across project lifecycle



# What makes a nuclear programme attractive to potential investors?





# Different investment drivers for different investor classes

Driver	Potential Investors							Pension Funds
	Nuclear operators (1)	Vertically integrated utilities	Power Investors	Nuclear reactor vendors	Major civil (EPC) contractors	Sovereign wealth funds	Infrastructure Funds	
Long Term Equity Return	✓	✓	✓✓	✗	✗	✓✓	✓✓	✓✓
Short Term Equity Return	✓	✓	✓	✓	✓	✓✓	✓✓	✓
Expand core service offering for a profit related to performance	✓✓	✓	✗	✓✓	✗	✗	✗	✗
Expand current service portfolio to hedge other activities	✗	✓✓	✓	✗	✗	✓	✓	✓✓
Access new generation capacity	✗	✓✓	✓✓	✗	✗	✗	✗	✗
Develop / retain knowledge / experience; gain creditability or access new markets	✓✓	✓	✓	✓✓	✗	✓	✗	✓

**Key:**

- ✓✓ Primary driver
- ✓ May be a driver for investment
- ✗ Unlikely to be a driver for investment

**Note:**

(1) May also be a vertically integrated utility

# General trends in nuclear industry and prospects after Fukushima

## Short-term impact

- The problems at the Fukushima plant resulted from one of the worst earthquakes in recorded history and subsequent tsunami; it has therefore presented one of the sternest tests a nuclear facility has ever faced
- 11 of the Japan's nuclear reactors were shut-down, six of which were fully condemned
- Immediate shutdown of older reactors (e.g. Germany)
- Safety reviews of reactors (Russia, Germany, Spain, Switzerland, UK, US)
- The following countries decided to abort further development and construction of new nuclear plants: Germany, Switzerland, Israel, Belgium. Most of the countries that had or planned to construct power plant revised their nuclear programs
- Cost of uranium since Fukushima disaster dropped from \$65 to \$50 per a pound

## Long-term impact

- Some experts predict increase in cost of nuclear power by 50% as the result of raised post-Fukushima safety regulations
- Higher safety and other costs and tougher financing for new and existing nuclear facilities that would render nuclear power less economic or uneconomic
- Re-evaluation of planned energy policy in all nuclear countries, with a greater focus on energy efficiency measures and natural gas and renewables installation
- Nuclear power is still the only readily available large-scale alternative to fossil fuels for production of continuous, reliable supply of electricity
- Insurance against future price exposure, where nuclear energy is not exposed to fossils price fluctuation
- Stress tests in number of countries has determined that while there are lessons to learn fundamentally the same events would not have occurred under the same extreme conditions with the modern Gen III+ designs. Therefore there are no technical reasons to stop a Gen III programme

Source: KPMG data, International Atomic Agency, World Nuclear Association, World Watch Institute

# Contacts



## **Robert Vartevanian**

Partner, Corporate Finance, KPMG in Russia & CIS  
Global Infrastructure and projects group  
Head of M&A and Financing

KPMG  
Presnenskaya  
Naberezhnaya, Block C  
Moscow, 123317 Russia

Tel +7 (495) 937 44 77  
Fax +7 (495) 937 44 99  
Mob +7 (916) 210 88 36

[RobertVartevanian@kpmg.ru](mailto:RobertVartevanian@kpmg.ru)

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